STEREOGRAMS ILLUSTRATING FOREST SITES

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Introduction

Aerial photographs can be used to recognize forest sites. Broad site classes based primarily upon topographic location and soils group can be consistently recognized and their boundaries easily outlined. The total height of the dominant trees, one factor in the determination of site index, is readily measured on aerial photos. In hardwood areas, 1/ and where panchromatic film has been used, species identification is difficult if not impossible. Often, however, the species association can be determined from the topographic site and soil group. Furthermore, tree height, volume, and rate of growth are significantly different by sites based on topography and soil.

The accompanying stereograms illustrate some forest-site conditions found in the unglaciated portion of the Central States. Although many forest sites are not represented, the photo interpreter should have little difficulty in using the simple system illustrated.

1/ Moessner, Karl E., Photo classification of forest sites. Journal of Forestry, Proceedings of the Annual Meeting 1948.

When photos are viewed in stereo, the vertical dimensions are greatly exaggerated in comparison with the horizontal. For this reason, topographic differences are easily recognized. Since topography 2/ modifies soil and air moisture, it has an important bearing on site quality. On photos, cool moist slopes are easily segregated from hot dry ones, and ridge and upper slopes are quickly separated from coves or bottoms. We can therefore establish a simple classification of three sites based on topography. These are:

Upland Dry - Ridge tops, the upper three-fourths of the south-facing (hot) slopes and the upper one-fourth of the north-facing (cool) slopes.

Upland Moist - Coves, ravines, and lower one-fourth of the south-facing (hot) slopes and lower three-fourths of the north-facing (cool) slopes.

2/ Auten, J. T., Prediction of site index for yellow-poplar from soil and topography. Journal of Forestry, 43: 662-668. September 1945.

Bottomland - Recent alluvial soil and low benches.

Obviously these three classes do not differentiate all the forest sites that could be recognized on photos by means of topographic differences. However, this classification has been tested using data from Forest Survey field plots, and stand and tree measurements have been found to differ significantly on these sites.

On limited areas where soils belong to one broad group, forest sites can be classified by topography alone. Over wider areas where several soil groups are found, it is advisable to consider also the parent material of the soil. Land forms are indicative of this material. Since they are topographic in character, they are easily recognized under stereo. The patterns formed by drainage, erosion, soil color, and land use are easily recognized on photos and can be used to identify soil groups. Charts 3/ have been devised that will aid in the photo-identification of soil groups and will be found helpful by any

3/ Jenkins, D. S., The origin, distribution and air photo identification of United States soils. Technical Report 52, Civil Aeronautics Adm., 1946.

forester who attempts to use air photos in site classification. Positive identification of parent material is often possible on a single pair of photos, and almost always possible over a flight line. However, the features used in soil identification may not always be present on photos of small areas, such as the following stereograms. It is hardly possible in a limited paper to discuss this phase of interpretation as fully as it warrants. Nevertheless, we can say that sites have been classified on photos by parent material of the soil, and that the species as well as stand and tree measurements were found to vary by soil group. For this reason the parent material of the soil in addition to other information is shown on each stereogram.

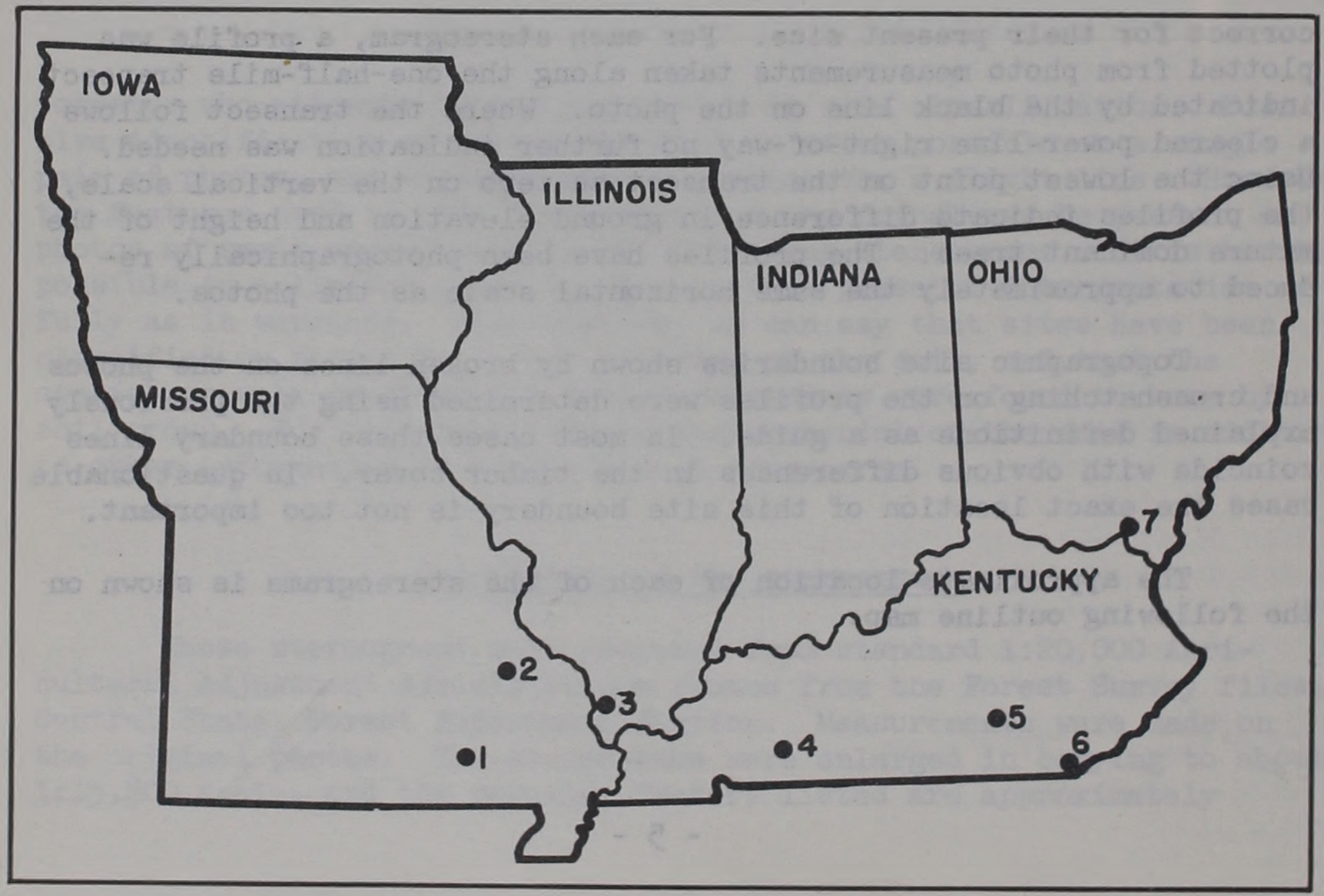
Description of the stereograms

These stereograms were prepared from standard 1:20,000 Agricultural Adjustment Administration photos from the Forest Survey files, Central States Forest Experiment Station. Measurements were made on the original photos. The stereograms were enlarged in copying to about 1:15,800 scale, and the parallax factors listed are approximately

correct for their present size. For each stereogram, a profile was plotted from photo measurements taken along the one-half-mile transect indicated by the black line on the photo. Where the transect follows a cleared power-line right-of-way no further indication was needed. Using the lowest point on the transect as zero on the vertical scale, the profiles indicate difference in ground elevation and height of the mature dominant trees. The profiles have been photographically reduced to approximately the same horizontal scale as the photos.

Topographic site boundaries shown by broken lines on the photos and crosshatching on the profiles were determined using the previously explained definitions as a guide. In most cases these boundary lines coincide with obvious differences in the timber cover. In questionable cases the exact location of this site boundary is not too important.

The approximate location of each of the stereograms is shown on the following outline map.

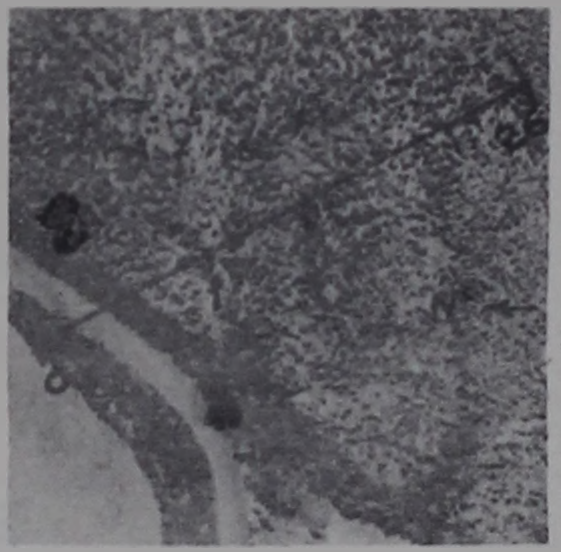


LOCATION OF STEREOGRAMS

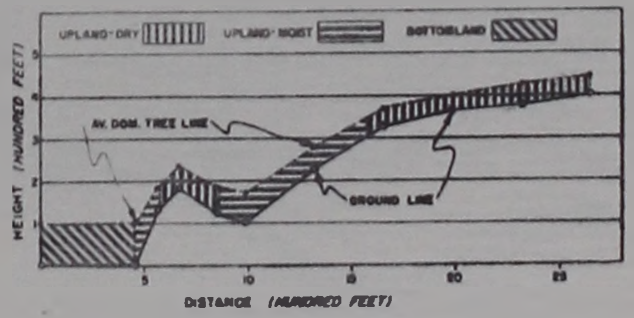
Stereogram 1

Stereogram 1 - Missouri Ozarks

This stereogram illustrates typical site differences found in the upland oak-hickory stands of Carter County, Missouri. The upland soil is derived from cherty limestones and sandstones and the alluvial bottom soil comes from the same parent material. Light color on the upper slopes is caused by a heavy mantle of chert bared by repeated fires. Dominant trees along the riverbottom, probably sycamore, measure 100 feet in height. Trees on the north slopes and in the cove sites vary from 50 to 70 feet. On the dry ridge tops and south slopes, trees measure less than 50 feet in height. Upland species are predominantly oaks and hickories. Continuous culling coupled with repeated fires have produced the typical open stands shown in this example.



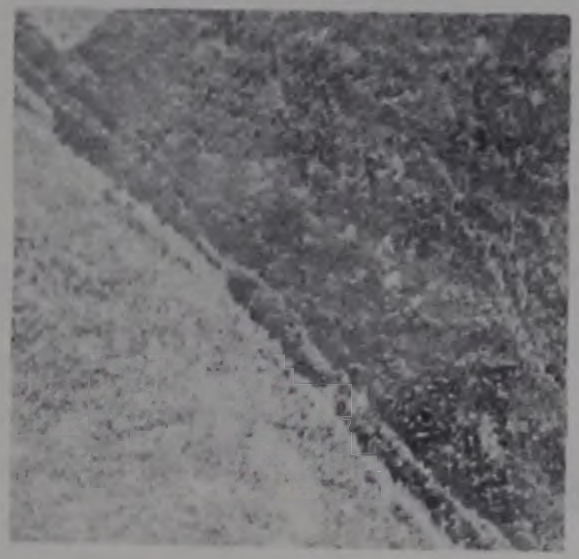
Type - Upland Hardwood
Soil - Residual from
cherty limestone
Type - Bottomland Hardwood
Soil - Recent alluvium
Location - Carter Co., Mo.
Photo - Date 7/6/39
Approx. Scale -
1:15,800
Parallax Factor -
4.1' per .001"

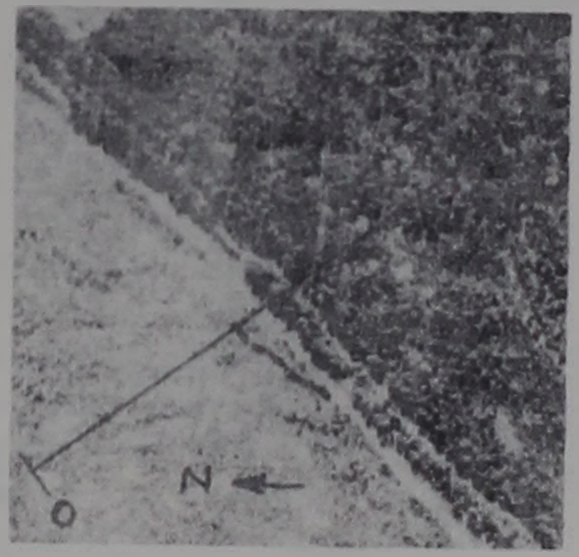


Stereogram 2

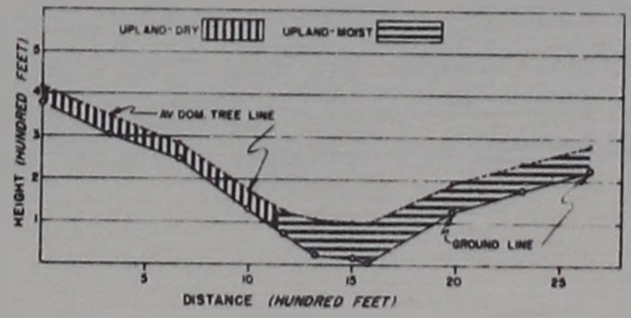
Stereogram 2 - Missouri Ozarks

This stereogram illustrates typical north-south slope differences found in upland oak-hickory stands of St. Francois County, Missouri. The soil is derived from igneous rock and can be recognized by the presence of bare rock areas where no soil is formed and no vegetation can grow. In this case, dominant trees along the extremely narrow water course reach 100 feet in height while those on the north slope vary from 50 to 70 feet. On the south slope the few dominant mature trees vary from 30 to 50 feet in height. Repeated fires have reduced the quality of these sites, and those on the exposed south slopes must be considered largely noncommercial.





Type - Upland Hardwood
Soil - Residual from
igneous rock
Location - St. Francois
Co., Mo.
Photo - Date 8/24/37
Approx. Scale -
1:15,800
Parallax Factor -
4.0' per .001"

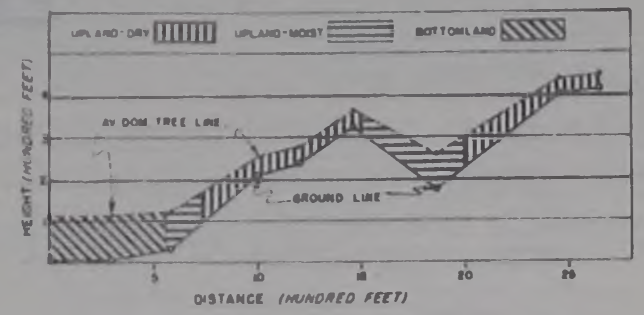


Stereogram 3

Stereogram 3 - Southern Illinois

This stereogram illustrates upland and bottomland sites in Union County, Illinois. Upland soil is loessal as evidenced by the knife ridges and by the steep right-angled drainage pattern that is only partially apparent in the stereogram. The level bottomland soil is formed by alluvial deposits of the Mississippi River. The dominant trees of the bottomland, largely cottonwood and soft maple, range from 110 to 120 feet in height. Differences between the bottomland and lower-slope sites are apparent by the degree of crown closure and by the change in topography. Trees on the moist lower slopes and coves are 50 to 90 feet high, while on the dry south slopes and ridges they are 40 to 60 feet. The principal upland species are oaks and hickories with some beech and yellow-poplar in the coves.

Type - Upland Hardwood
Soil - Loessal
Type - Bottomland Hardwood
Soil - Recent alluvial
Location - Union Co., Ill.
Photo - Date 8/24/48
Approx. Scale -
1:15,800
Parallax Factor -
2.9' per .001"

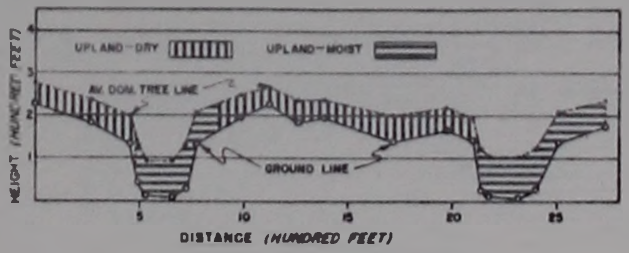


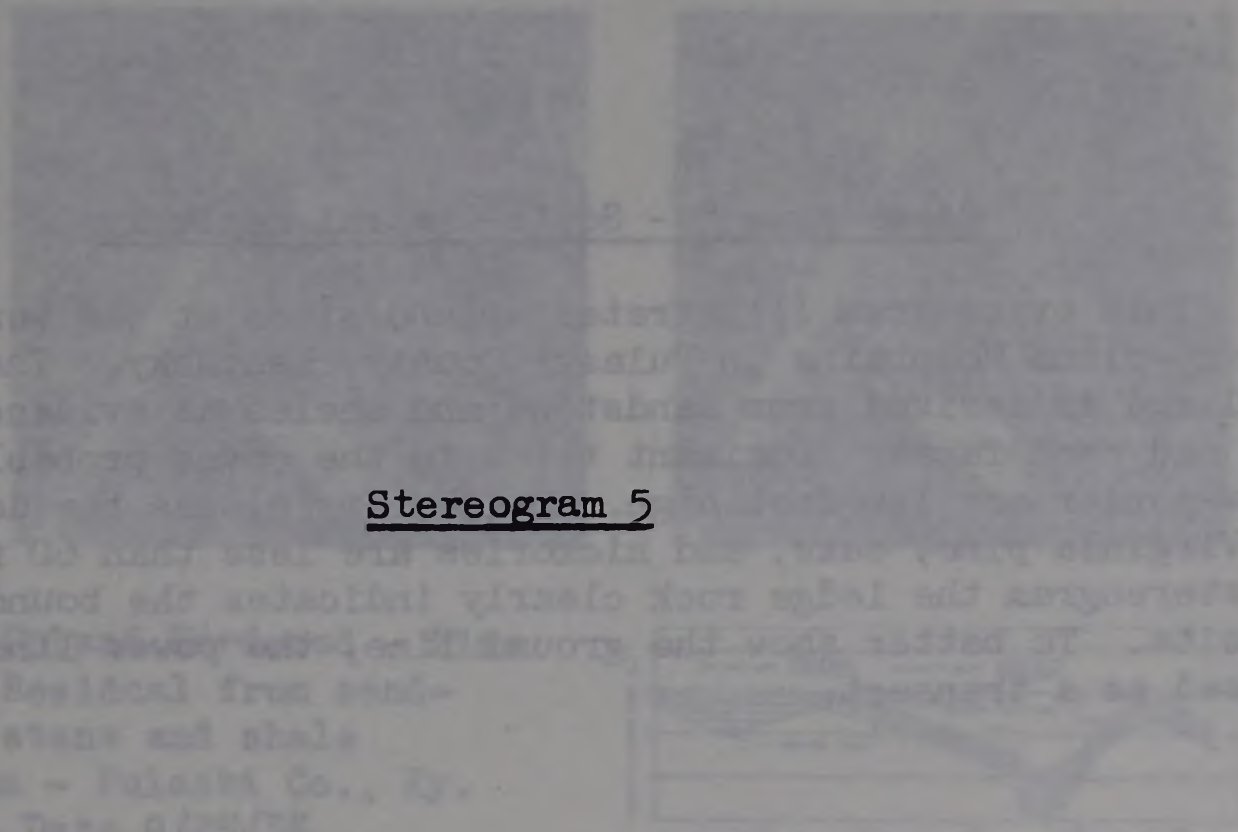
Stereogram 4

Stereogram 4 - West-central Kentucky

This stereogram illustrates some upland cove sites in Todd County, Kentucky. The soil is derived from sandstone, shale, and limestone, as indicated by the U-shaped drainages, abrupt rock faces, and steep heads of the coves. Taken in winter, these photos clearly show the mixed pine-hardwood stands. The height of dominant trees varies from 100 feet in the coves to 60 feet on the upper north slopes. Dominants on dry sites vary from 40 to 60 feet. When this area was checked in the field, eastern while pine was found in the coves and on the north slopes, while Virginia pine occupied most of the ridge tops and dry sites. The nearest stands of eastern white pine are found in the Cumberland Mountains nearly 150 miles northeast of this area.

Type - Upland Pine -
Hardwood
Soil - Residual from sand-
stone and shale
Location - Todd Co., Ky.
Photo - Date 3/24/38
Approx. Scale -
1:15,800
Parallax Factor -
3.9' per .001"



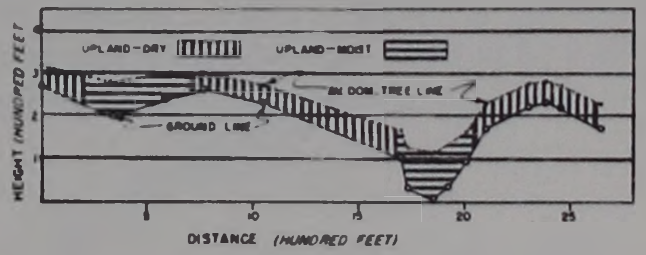


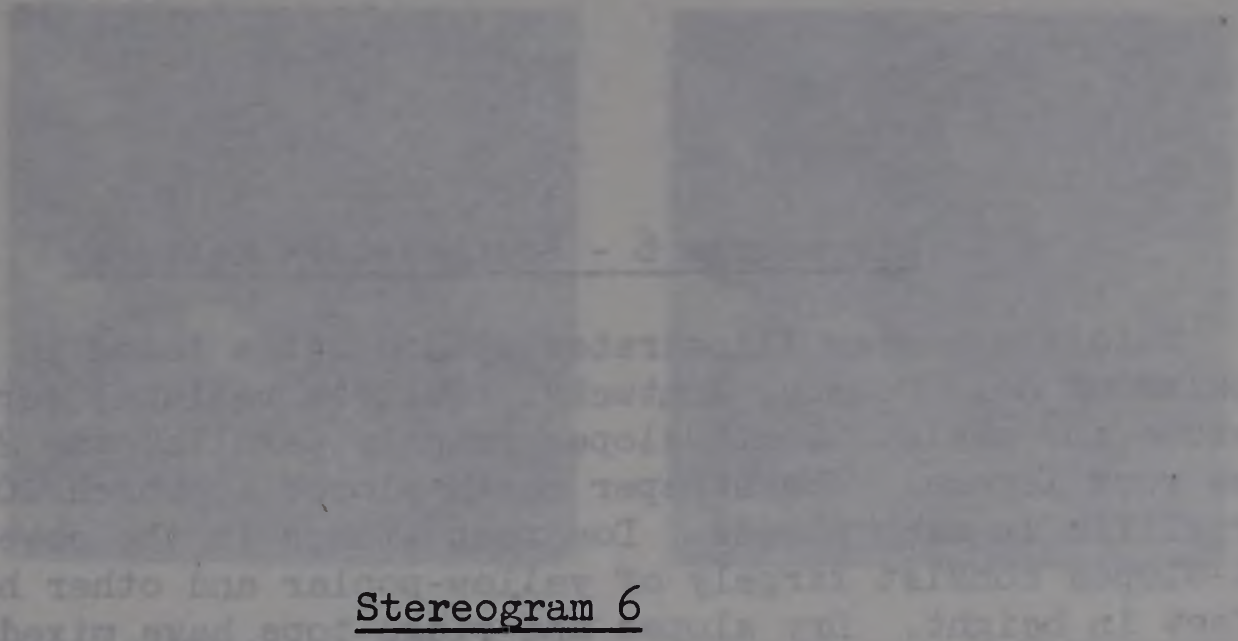
Stereogram 5

Stereogram 5 - South-central Kentucky

This stereogram illustrates upland sites at the western edge of the Cumberland Mountains in Pulaski County, Kentucky. The soil is residual and is derived from sandstone and shales as evidenced by the deep coves and rock faces. Dominant trees in the coves probably beech and yellow-poplar are 110 feet high. On the dry slopes the dominants, probably Virginia pine, oaks, and hickories are less than 60 feet high. In this stereogram the ledge rock clearly indicates the boundaries of the cove site. To better show the ground line, the power line right-of-way was used as a transect.

Type - Upland Hardwood - Pine
Soil - Residual from sand-
stone and shale
Location - Pulaski Co., Ky.
Photo - Date 9/25/38
Approx. Scale -
1:15,800
Parallax Factor -
3.9' per .001"

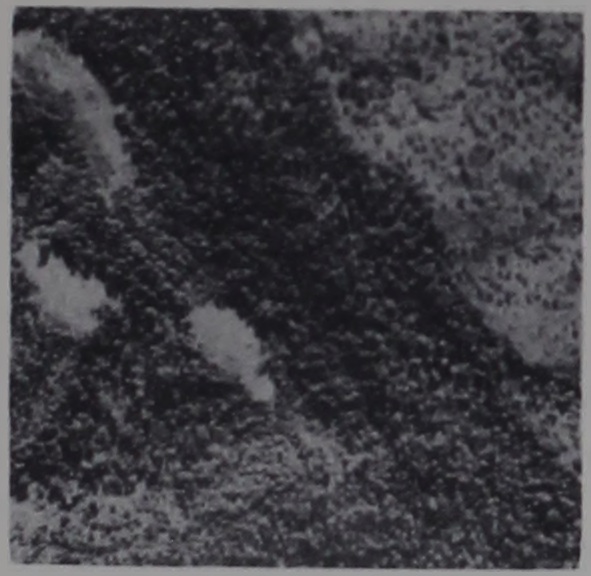


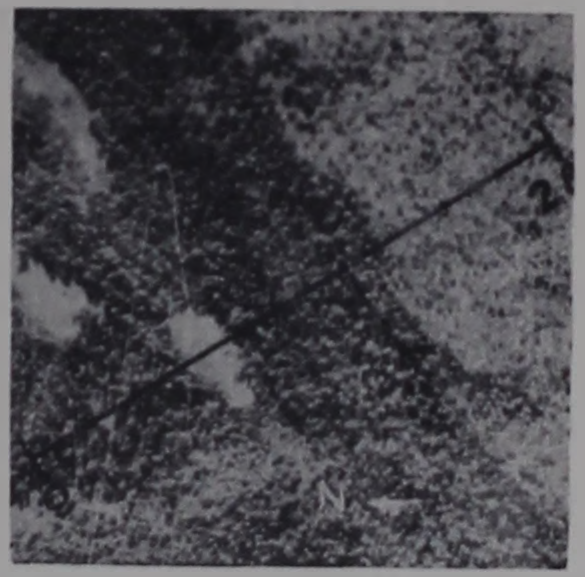


Stereogram 6

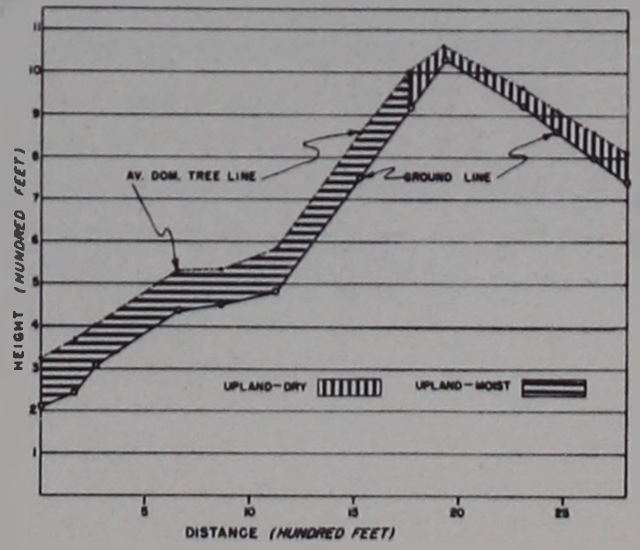
Stereogram 6 - Southeastern Kentucky

This stereogram illustrates upland sites found in the Appalachian Mountains of Bell County, Kentucky. Soil is residual derived from tilted sandstone and shale. South slopes roughly parallel the 25 percent tilt of the rock layers. The steeper north slopes approach 100 percent with sheer cliffs in many places. Dominant stands in the coves and on lower moist slopes consist largely of yellow-poplar and other hardwoods often 120 feet in height. Dry slopes and ridge tops have mixed pine and hardwood stands 40 to 60 feet in height. In this stereogram, site changes are indicated just below the crest of the ridge on the north slope, even though the general rule is to drop the line one-fourth of the distance down the slope. In such steep country the shaded moist site may reach nearly to the crest of the ridge.





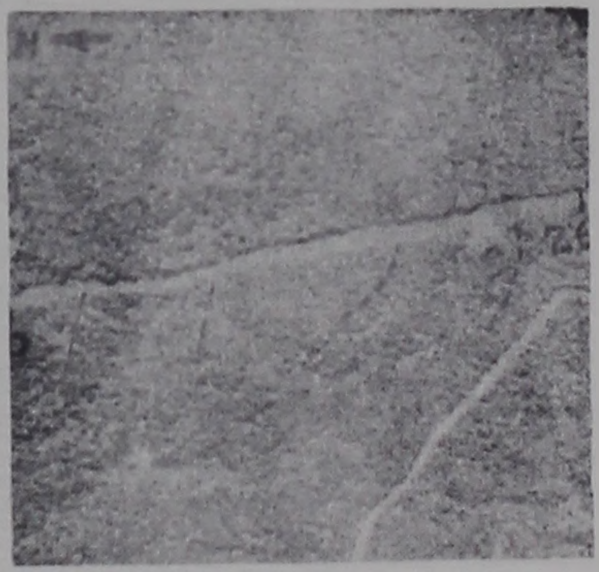
Type - Upland Hardwood Pine
Soil - Residual from tilted
sandstone and shale
Location - Bell Co., Ky.
Photo - Date 5/18/39
Approx. Scale -
1:15,800
Parallax Factor -
3.8' per .001"



Stereogram 7

Stereogram 7 - South-central Ohio

This stereogram illustrates upland sites found in the hills of Scioto County, Ohio. The soil is residual derived from sandstone and shale. In the coves and on the moist sites the dominant trees, often yellow-poplar, measure 90 to 100 feet in height. Mixed oak species found on the ridge tops and dry slopes measure from 30 to 50 feet in height. This area was cut over approximately 70 years ago. The ragged appearance of the cove stands indicates heavy culling, and it is probable that the trees remaining are of low quality. The brushed right-of-way of a power line has been used as a transect. The relatively level site in the center of the transect, which has been called a dry site, actually is approaching the better moist-site conditions. Variation in tree height is visible in the shadows thrown on the power-line clearing.



Type - Upland Hardwood
Soil - Residual from sand-
stone and shale
Location - Scioto Co., Ohio
Photo - Date 7/11/39
Approx. Scale -
1:15,800
Parallax Factor -
4.0' per .001"